

The Leaf Economics Spectrum of Triploid and Tetraploid C_4 grass *Miscanthus x giganteus*

Background/Objective

- *Miscanthus* × *giganteus* (*Mxg*) has become a promising C_4 feedstock for bioenergy and bioproducts.
- The leaf economics spectrum (LES) describes multivariate correlations in leaf structural, physiological, and chemical traits, but contribution of C_4 species to the global LES is less studied. Greater understanding of leaf functional traits and trait relationships will help guide efforts to further improve resource use efficiency and productivity in *Mxg*.

Approach

- We collected leaf functional traits from more than 200 genotypes of *Mxg* grown in two common garden experiments in 2018 and 2019.
- We also compared leaf functional traits of *Mxg* with published values from sorghum and the global LES.

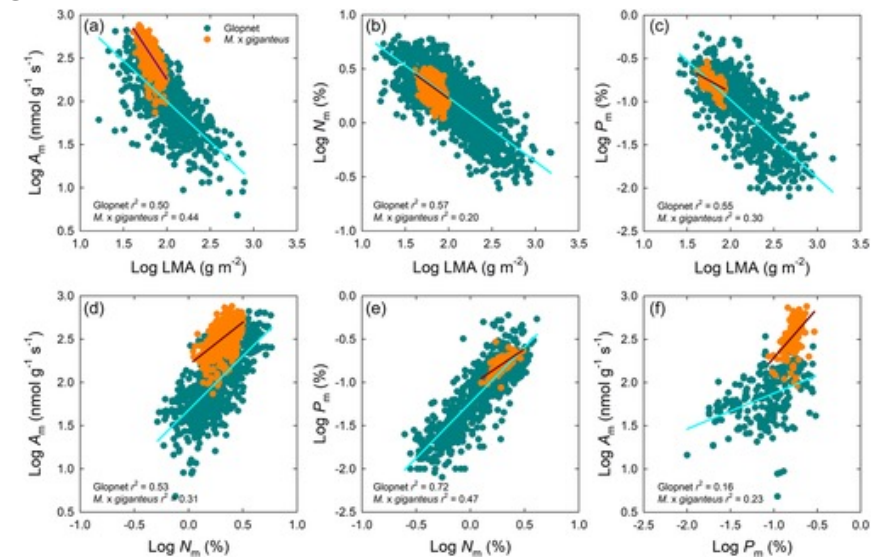
Results

Our results reveal substantial genotypic trait variation in *Mxg* and highlight significant differences in leaf trait and trait relationships between triploids and tetraploids. Compared to the global LES, *Mxg* genotypes had higher photosynthetic rates, lower stomatal conductance, and less nitrogen content, indicating greater water and photosynthetic nitrogen use efficiency in the C_4 species.

Significance/Impacts

This study is the first to explicitly quantify the contributions of genotypic trait variation and ploidy levels in C_4 species in agricultural systems to global LES.

These findings suggest the potential for ploidy to alter LES traits, and therefore needs more attention in the global trait databases.



Relationships among leaf economics spectrum traits in *Miscanthus* × *giganteus* compared with the global pattern using the Glopnet database.